

REMARKS

The specification has been amended to correct grammatical errors. In addition, claim 1 has been amended, claim 13 has been canceled, and claims 28-33 have been added. As such, claims 1-5, 7-12, 14-16, and 28-33 are currently pending in the case. Further examination and reconsideration of the presently claimed application are respectfully requested.

Section 102 Rejections

Claims 1-5, 7, 8, 10, 11 and 14-16 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,337,285 to Ko (hereinafter referred to as “Ko ‘285”). The standard for “anticipation” is one of fairly strict identity. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. Of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), MPEP 2131. Ko ‘285 does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

Ko ‘285 does not disclose etching a first portion of a dielectric layer with an etch chemistry which is substantially free of hydrogen. Independent claim 1 recites in part:

A method for forming a semiconductor device, comprising: etching a first portion of a dielectric layer formed on a semiconductor topography with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen ...

Ko '285 discloses a two-step dual-chemistry process for etching through a selected portion of an insulating oxide layer. (Ko '285, Abstract). However, as noted in responses to previous Office Actions mailed April 26, 2002 and November 19, 2002, Ko '285 does not teach or suggest an etch chemistry which is substantially free of hydrogen. The Office Action mailed June 4, 2003 traverses such a declaration by citing column 5, lines 62-67 and column 6, lines 1-22 of Ko '285 as presenting an etch chemistry which is substantially absent of hydrogen. Although Ko '285 does not explicitly teach the inclusion of hydrogen in such a citing, Ko '285 does not explicitly teach an etch chemistry without hydrogen. In addition, Ko '285 specifically includes hydrogen within each of the etch chemistries of the example process parameters discussed in column 7, lines 3-58. As such, it is asserted that without any explicit teaching or suggestion of etching a dielectric layer with an etch chemistry which is absent of hydrogen, Ko '285 cannot anticipate the limitations of claim 1.

For at least the reasons stated above, Applicants assert that independent claim 1 and claims dependent therefrom are not anticipated by the cited art. Accordingly, Applicants respectfully request removal of this rejection.

Section 103 Rejections

Claims 9, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ko '285 in further view of U.S. Patent No. 6, 117,791 to Ko et al. (hereinafter referred to as "Ko '791"). Claims 1-5, 7, 8 and 10-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,025,255 to Chen et al. (hereinafter referred to as "Chen") in view of U.S. Patent No. 5,631,179 to Sung et al. (hereinafter referred to as "Sung") and U.S. Patent No. 5,314,575 to Yanagida (hereinafter referred to as "Yanagida"). Claims 9, 15 and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chen in view of Sung, Yanagida and Ko '791. Claim 13 has been canceled rendering rejection thereto moot. To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F. 2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). The cited art does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

None of the cited art teaches or suggests etching a second portion of a dielectric layer within an etch chemistry having a dielectric material:silicon oxide selectivity of at least approximately 5:1, wherein the dielectric layer comprises the dielectric material. Amended claim 1 recites in part:

A method for forming a semiconductor device, comprising ... etching a second portion of the dielectric layer with a second etch chemistry ... wherein the second etch chemistry has a dielectric material:silicon oxide selectivity of at least approximately 5:1, and wherein the dielectric layer comprises the dielectric material.

Support for such a limitation may be found, for example, on page 12, lines 4-5, "... the second etch chemistry may have a dielectric layer material:silicon oxide selectivity of at least approximately 5:1." Although some of the cited art disclose oxide:nitride etch selectivities, none of the cited art discloses etch selectivities between a dielectric material being etched and an underlying layer of silicon oxide. In particular, neither Ko '285, Ko '791, Chen, Sung, nor Yanagida mention dielectric layer material:silicon

oxide selectivity of the etch chemistries taught therein. To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03.

The Office Action states that ranges of etch selectivity are considered to involve routine optimization. Such a statement, however, is traversed. The etch selectivity limitation of claim 1 is specific to the composition of the chemistry of the second etch process. As noted on page 30, lines 8-12,

...the second etch chemistry may include hydrofluorocarbons such as C₂H₂F₄ and CHF₃. In addition, the second etch chemistry may include an inert gas such as argon or xenon. Furthermore, the second etch chemistry may include a number of additional fluorinated carbon compounds and/or chlorinated carbon compounds such as CFCl₃, CF₂Cl₂, CF₃Cl, CF₄, C₂F₆, and C₂ClF₅.

As such, the second etch chemistry may include specific combinations of such compounds in order to obtain a dielectric material:silicon oxide etch selectivity of at least 5:1. In addition, the second etch chemistry may be characterized by its ratio of components. The presently claimed case outlines such ratios by specifying the flow rates of exemplary components on page 31, lines 1-7 of the Specification. Without any teaching or suggestion of etch chemistries which may include all of compounds and ratios of compounds described in the presently claimed case, it is asserted that it would not be obvious to one skilled in the art to create an etch chemistry within a dielectric material:silicon oxide selectivity of at least approximately 5:1 by routine optimization.

For at least the reasons stated above, Applicants assert that independent claim 1 and claims dependent therefrom are patentably distinct over the cited art. Accordingly, Applicants respectfully request removal of this rejection.

Patentability of the Added Claims

The present Amendment adds claims 28-33. As will be set forth in more detail below, claims 28-33 are patentably distinct over the cited art.

None of the cited art teaches or suggests a method which includes etching a first portion or a second portion of a dielectric layer with an etch chemistry comprising fluorinated carbon compounds and chlorinated carbon compounds. Added claim 28 recites in part:

A method for processing a semiconductor topography, comprising: etching a first portion of a dielectric layer formed on a semiconductor topography with a first etch chemistry, wherein the first etch chemistry is substantially free of hydrogen and comprises fluorinated carbon compounds and chlorinated carbon compounds ...

A similar limitation is recited in added claim 31 for the etch chemistry used to etch a second portion of a dielectric layer. Support for the limitation of added claim 28 may be found, for example, on page 27, lines 16-18, "... the first etch chemistry may include a number of additional fluorinated carbon compounds and/or chlorinated carbon compounds...". Support for the limitation of added claim 31 may be found, for example, on page 30, lines 10-12, "... the second etch chemistry may include a number of additional fluorinated carbon compounds and/or chlorinated carbon compounds...". Neither Ko '285, Ko '791, Chen, Sung, nor Yanagida teach or suggest etching a dielectric with an etch chemistry comprising a chlorinated carbon compound, much less an etch chemistry comprising both fluorinated and chlorinated carbon compounds.

For at least the reasons stated above, Applicants assert that independent claims 28 and 31, as well as claims dependent therefrom, are patentably distinct over the cited art. Accordingly, Applicants respectfully request approval of added claims 28-33.

CONCLUSION

This response constitutes a complete response to the issues raised in the Office Action dated June 4, 2003. In view of remarks traversing rejections, Applicants assert that pending claims 1-5, 7-12, 14-16 and 28-33 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

No fees are required for filing this amendment; however, the Commissioner is authorized to charge any additional fees, which may be required, or credit any overpayment, to Conley Rose, P.C. Deposit Account No. 03-2769/5298-04100.

Respectfully submitted,



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